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DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN ELECTRICAL FILTERS

(71) We, THOMSON — C S F, a French Body Corporate, of 101, Boulevard Murat, 75 — Paris (16ème) France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention relates to improvements in coupled-cavity electrical filters and more particularly to bandpass filters with a wide tuning range such as the wideband filters used in television for bands IV and V operation.

Those skilled in the art will be aware that two principles may be applied for the design of such filters, the first one using fixed intercavity coupling and the second one adjustable intercavity coupling, this making it possible to reduce the number of cavities in relation to the previous solution.

This later solution is the more attractive but implementation of it is a delicate procedure in particular where the filter is to pass a substantial amount of power.

The object of the present invention is to provide a filter equipped with a simple, comparatively inexpensive, and reliable device for producing adjustable intercavity coupling.

In accordance with the invention, there is provided an electrical filter comprising at least two resonant cavities having a common wall and coupled by a slot formed in said common wall, said wall being formed by two parallel slotted metal plates, a metal shutter being slidingly mounted between said plates, and means being provided for ensuring a good contact between said shutter and each of said plates; said filter further comprising control means for controlling the sliding of said shutter.

The invention will be better understood, and others of its feature rendered apparent, from a consideration of the description and the attached drawings in which:

Fig. 1 is a sectional view of an embodiment of a filter in accordance with the invention.

Fig. 2 is a front view of part of the filter of Fig. 1,

In Fig. 1, three cavities or cells, 1 to 3, each of which is a rectangular parallelepiped, are respectively equipped with adjustable axial tuning plungers 4 to 6, and coupled with one another by slots 7 and 8 provided in the walls which separate the cavities 1 and 2 on the one hand and 2 and 3 on the other.

Each of these walls is formed by two parallel metal plates 9 and 10 between which a corrugated metal shutter 11 is slidingly mounted, the crest and bottom lines of the corrugation being perpendicular to the direction of displacement. The corrugation of the shutter ensures a good contact between the shutter and each of the plates.

The signals to be filtered are applied at a terminal 12, which is coupled to the cavity 1 by a loop 13, and picked up at the terminal 14 which is coupled to the cavity 3 by a loop 15.

Each cell 1 to 3 resonates at a frequency which is determined by the electrical length of the tuning plunger, the quarter of the wavelength corresponding to this frequency being equal to this electrical length; the tightness of the coupling is adjusted by obturating the slots 7 or 8 to a greater or lesser extent by means of the shutter 11, the mechanical control of the latter being described hereinafter.

In Fig. 2, where similar references to those used in Fig. 1 represent similar elements, the shutter 11 is integral with a tubular threaded part 16 running on a threaded rod 17, the rotation of which causes displacement of the shutter in front of the slot 7 and, consequently adjustment of the tightness of coupling.

A device of this kind enables accurate and reliable adjustment to be effected coupled with easy position marking. In particular, it is possible to effect symmetrical adjustment of the filter, so that its input and output can be reversed.

Self-evidently, these arrangements are

applicable to filters with an arbitrary number of cavities whatever their design principle.

It is evident from the foregoing that this filter structure is a particularly advantageous one.

From the electrical point of view, for example, the performances obtained in the 470—960 M/c band were as follows with a filter having only 5 cavities:

—passband of 10 M/c with an attenuation less than 0.2 db;
—attenuation of at least 3 db at 15 Mc from the centre of the passband and of at least 30 db at 30 Mc.
—standing wave ratio of less than 1.02 in the passband;
—transmitted power: several tens of watts.

From the mechanical point of view the high reliability and reproducibility of the adjustments make it possible to calibrate the settings as a function of the centre frequency.

From the design point of view, the simplicity of the variable coupling device makes it possible to secure an appreciate economy in the overall cost whilst at the same time reducing the size in relation to fixed-coupling filters with a large number of cavities.

WHAT WE CLAIM IS:—

1. An electrical filter comprising at least two resonant cavities having a common wall and coupled by a slot formed in said common wall, said wall being formed by two parallel slotted metal plates, a metal shutter being slidingly mounted between said plates and contact means being provided for ensuring a good contact between said shutter and each of said plates; said filter further comprising control means for controlling the sliding of said shutter.

2. An electrical filter as claimed in claim 1, wherein said contact means consists of a corrugation in said shutter.

3. An electrical filter as claimed in claim 2 wherein the crest and bottom lines of said corrugated shutter are perpendicular to the direction of placement of said shutter.

4. An electrical filter as claimed in any one of the preceding claims, wherein said control means comprise a tubular threaded part integral with said shutter and a threaded rod, the rotation of which ensures the displacement of said part and said shutter in a direction parallel to the axis of said rod.

5. An electrical filter as claimed in any one of the preceding claims, wherein each of said cavities is provided with an axial plunger of adjustable length which produces resonances therein at a frequency determined by the electrical length of the plunger, the quarter of the wavelength corresponding to said frequency being equal to said electrical length.

6. An electrical filter substantially as described with reference to the accompanying drawings.

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1297224 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

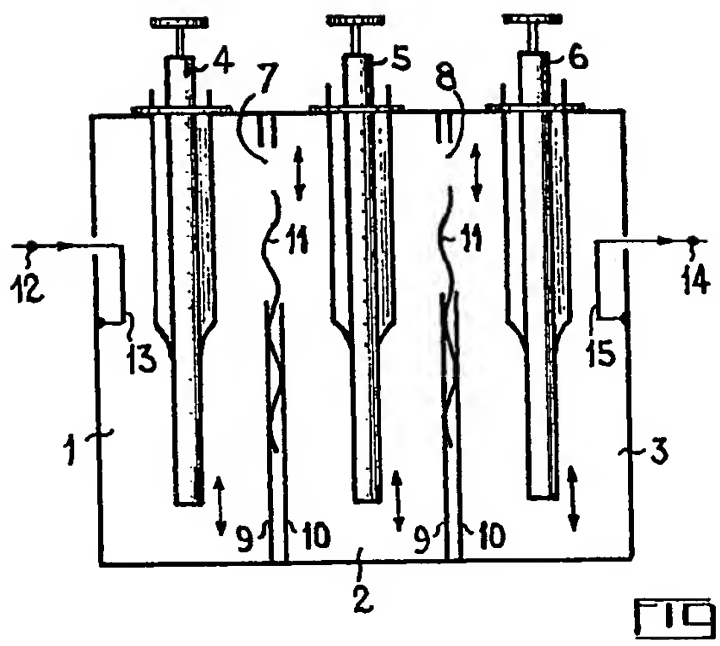

FIG.1

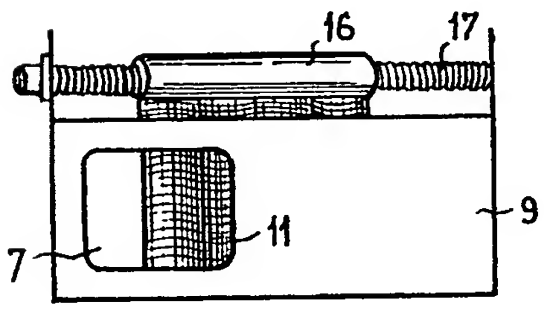

FIG.2